



A GUIDE TO THE SOUTH GROVE TRAIL OF CALAVERAS BIG TREES

∞ CALAVERAS BIG TREES STATE PARK ∞

There is something wonderfully attractive in the king tree, even when beheld from afar, that draws us to it with indescribable enthusiasm; and when one of the oldest attains full stature on some commanding ridge it seems the very god of the woods.

-John Muir

Welcome to the South Grove of Sierra Redwoods in Calaveras Big Trees State Park.

The Trail

Depending on your route, you may hike 3.5 to 5 miles (5.6 to 8.1 km) on this trail. The first 1.5 miles (2.4 km) of trail is a moderate, steady climb from the parking lot to the start of the loop trail, with a gain of 260 feet (79 m) in elevation.

The loop trail passes through a representative portion of the lower part of the grove. Just over one mile (1.6 km) in length, this section of trail first climbs 200 feet (61 m), then gently descends back to the start of the loop.

Halfway around the loop, you will find a side trail leading to the upper grove and the largest tree in the park—the Agassiz Tree. At about 0.6 miles (1 km) in each direction, this trail gently climbs 100 feet (30 m).

- Allow 1 1/2 to 3 hours for the 3.5 mile (5.6 km) hike from the parking lot around the loop trail.
- Allow 2 1/2 to 4 1/2 hours for the 5 mile (8.1 km) hike to the Agassiz Tree.

Once you are within the boundaries of the preserve, you may hike off the trail. Stay on the trail until you reach the preserve boundary—refer to the map and trail guide directions. Please choose to hike off-trail only if you can navigate through an unfamiliar wilderness area.

Garbage cans and restrooms are available at the parking lot only. Carry your own water, as it is not advisable to drink untreated water from any Sierran Stream.

The Preserve

The interpretive trail will lead you through a pristine stand of Sierra redwoods, the earth's largest living objects. The South Grove contains about 1,000 large Sierra redwoods—also known as Giant Sequoias—about 10 times as many as the North Grove. The largest redwoods in the park are found here in the remote tranquil South Grove.

The lack of human influence is an outstanding feature of this preserve. Many Sierra redwood groves were severely disturbed following their discovery by settlers in the late 1800's. The Calaveras South Grove Natural Preserve offers a unique opportunity to visit and study this ancient forest ecosystem in its primeval condition. Remember to tread lightly in this protected forest preserve.

Memorial Groves

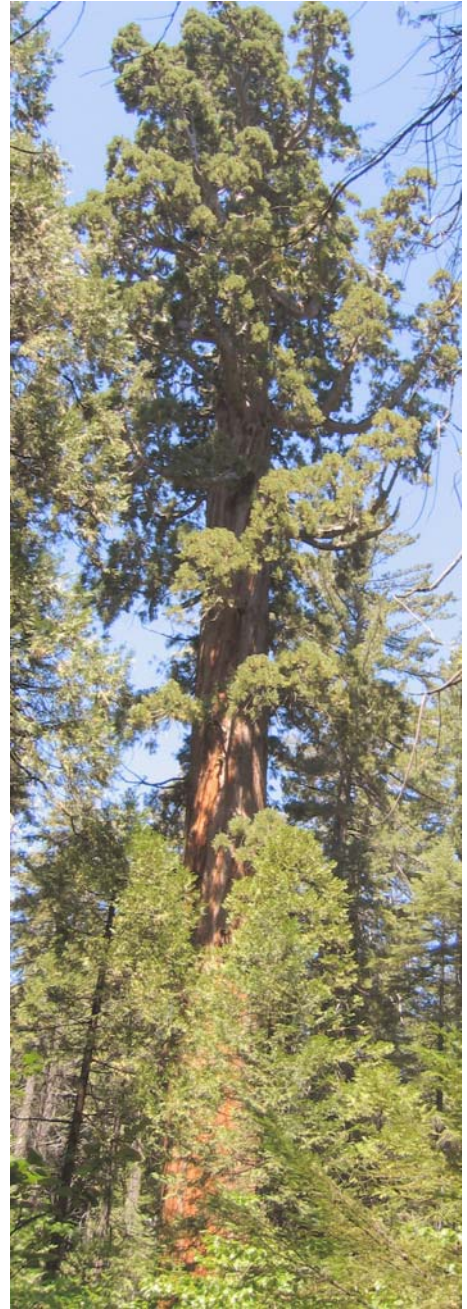
The Bronze Plaque at the trailhead bears the names of the individuals and organizations that made contributions to the campaign to purchase the South Grove. Since half of the \$2.8 million purchase had to be raised by public subscription, when gifts of \$5,000 or more were received a Memorial Grove was designated within the South Grove. Donations for memorial groves are used by the Save-the-Redwoods League for the purchase and protection of redwood groves located elsewhere in the state as well as for land additions to Calaveras Big Trees State Park.

How This Guide Works

This is an interpretive trail, meaning that the natural and historical features of the preserve are explained or “interpreted” along the way. This brochure is your only guide to these features. In order to preserve the wilderness qualities of the grove it is keyed to natural landmarks rather than to signs or numbered posts.

Please refer to the included map. There are six to eight widely spaced stops on this hike, depending upon which route you choose to take. Each large dot on the trail map represents a stop. Please follow the **TRAIL DIRECTIONS IN LARGE CAPITAL LETTERS**. Match the illustrations with the features of the trail to identify the location of each stop.

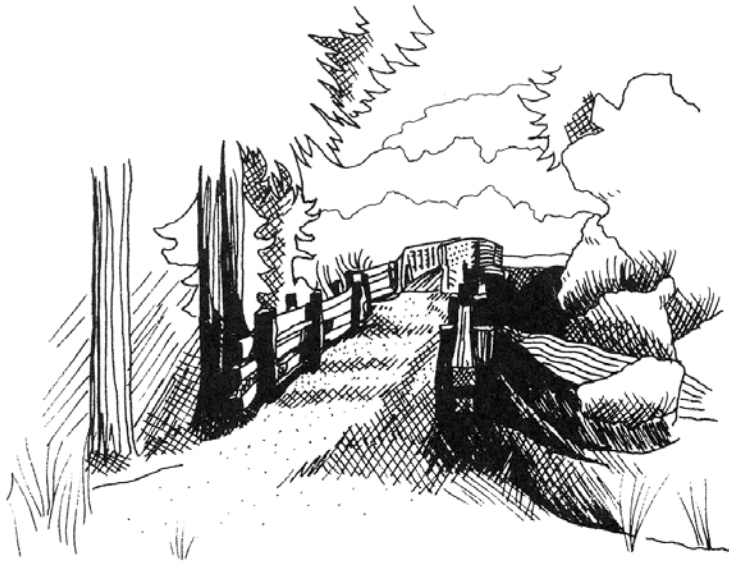
Ready? Begin by reading and following the trail directions presented like this . . .



For More Information on the South Grove

The Visitor Center located in the North Grove, just inside the park has a more detailed map available for purchase. This map lists all of the memorial groves and includes topographical lines as well as further information on the ecology and history of the grove.

 **FOLLOW THE TRAIL THROUGH THE MEADOW OF NATIVE BUNCHGRASSES. STOP AT THE BRIDGE ACROSS BEAVER CREEK.**

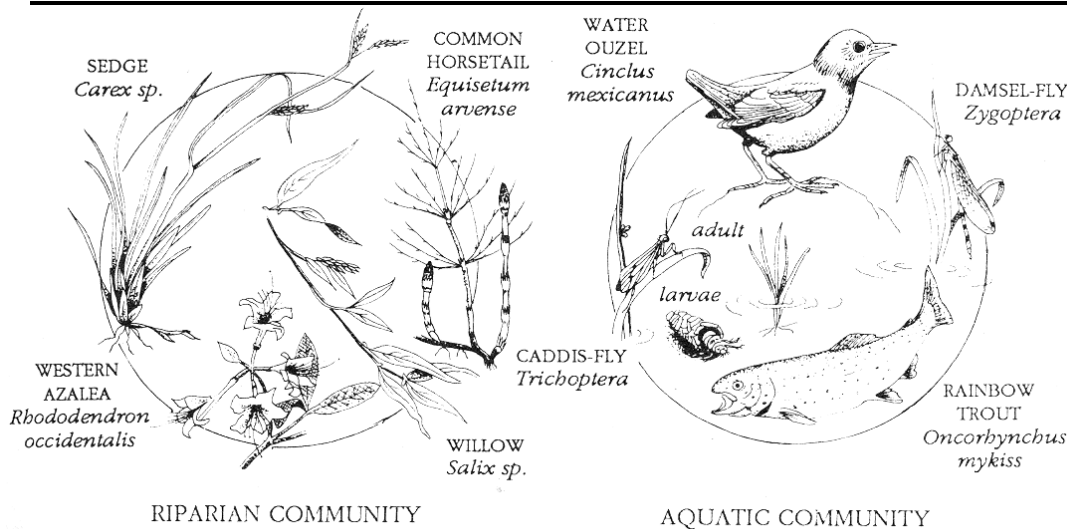


Many long-time visitors to the park will remember the days when it was necessary to wade through the chilly and sometimes swift water of Beaver Creek to enter the South Grove. In 1985, Calaveras Big Trees State Park's cooperative association, Calaveras Big Tree Association (CBTA) purchased this permanent foot bridge for the park to provide easy access to the preserve. Since 1974, the association has supported many park activities and programs by providing funding through fund raising efforts. The efforts of this organization are priceless and are still being conducted today.

The animals for which Beaver Creek was named have not been sighted in the park for many years. Beavers are not native to this area, and may have been introduced here at one time for fur trapping.

Looking down from the bridge, you have a view of the 130-million-year-old granite rock that underlies the South Grove and forms the backbone of the Sierra Nevada. In the grove it remains almost completely covered by soil and alluvium, but here the creek has eroded those layers, exposing the rock.

The other main type of rock found in the preserve is a type of andesitic lava called the Mehrten Formation. This reddish gray rock composed of mud, ash and pieces of andesite caps the ridges on either side of the grove. It was created 5 to 11 million years ago when volcanoes to the east produced enormous mud and ash flows called lahars. Lahars covered most of the young Sierra Nevada Range like a thick blanket. While much of the rock has eroded away, this formation still can be seen in several park locations.



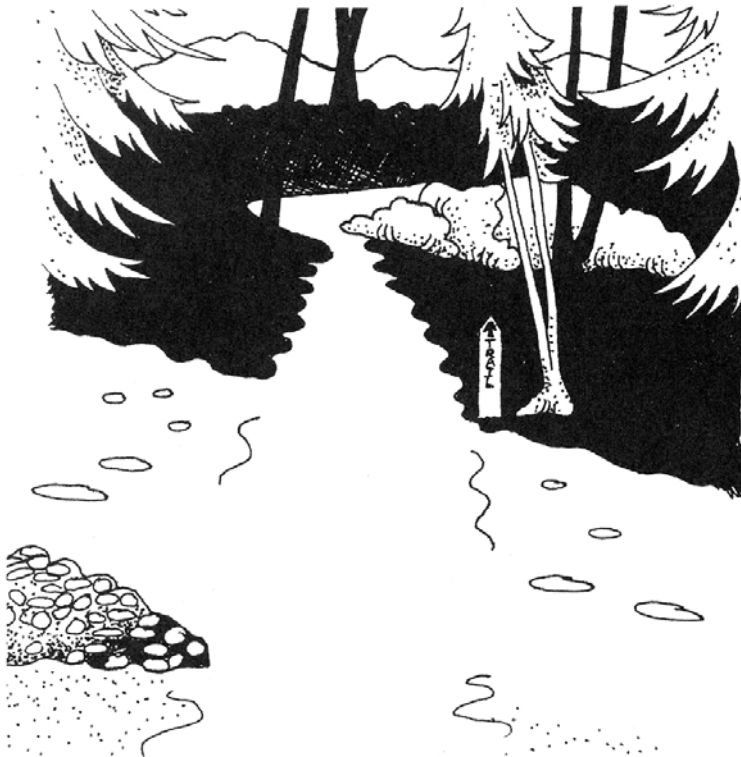
The assemblage of plants and animals that live along the edge of a creek is called a riparian community. The members of this community are adapted to living near permanent water and are rarely found elsewhere. An interesting riparian plant is

called the horsetail, whose ancestors appeared 400 million years ago—before redwood trees and dinosaurs—and reached heights of 50 feet (15.2 m). Horsetails are rough to the touch due to deposits of silica in their outer cells. This earned them the nickname “scouring rushes” during the frontier days when they were used in cleaning pots and pans.

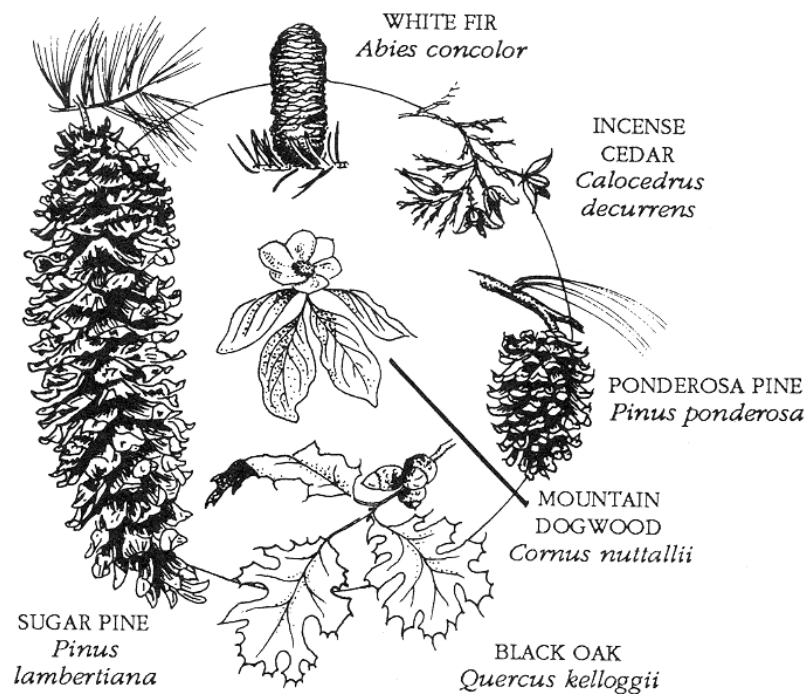
The plants and animals living in the water belong to the aquatic community. One of the most enjoyable members of the aquatic community is the small slate-gray bird called the water ouzel. This bird is completely adapted to life in and around rushing water, walking and swimming underwater in its search for insect larvae, aquatic insects, and small fish. Also called a dipper, it is often seen bobbing up and down while perched on streamside rocks. Some members of both communities are illustrated below.

On the left side of the trail, just after the bridge, the Bradley Grove Trail begins. The main feature of this 2.5 mile (4 km) loop is a grove of young Sierra Redwoods planted in the 1950's by South Grove caretaker Owen Bradley. There are guides for this trail in the box at the beginning of the Bradley Grove Trail.

FOLLOW THE SOUTH GROVE TRAIL FOR ALMOST ONE MILE (1.6 KM) AS IT PASSES THROUGH A MIXED CONIFEROUS FOREST. YOU WILL CLIMB OUT OF THE BEAVER CREEK DRAINAGE, THEN START TRAVELING ALONG BIG TREES CREEK, WHICH FLOWS FROM THE SOUTH GROVE. STOP WHERE THE TRAIL CROSSES A DIRT ROAD.



You are now at the western boundary of the preserve. If you look to your right as you enter the preserve you will begin to see the rounded crowns and reddish trunks of the redwoods rising above the other trees of this community. Sierra redwoods do not grow in pure stands as do the coast redwoods. They exist as part of the ponderosa pine belt, an interrelated community of plants and animals that occurs between about 2,000 and 7,000 feet (609.6 - 2,133.6 m) in the Sierra Nevada. The distribution of plants and animals in the Sierra is controlled by altitude, temperature, rainfall, and soil type. The most common trees of the ponderosa pine belt are illustrated on the next page. Because of the extremely favorable growing conditions here and since much of the ponderosa pine belt has been extensively logged, the undisturbed pines found in the South Grove are some of the largest of their kind.



In about 50 feet (15 m) you will come to an old logging railroad right of way. This site serves as a reminder of how close the South Grove came to being destroyed by logging.

While there is no documented “discovery” of the South Grove, it was well known by 1856, when the first visitors staying the North Grove would ride here on horseback. The first owners were interested in developing the grove as a tourist attraction, which turned out to be a less than lucrative business due to its remote location. The ownership of the grove changed hands several times until it was sold to the Pickering Lumber Company in 1929.

Many Sierra redwood groves were logged from the late 1800's through the 1950's—about 35% of their original acreage. From the start, there were people such as John Muir who realized that these rare and ancient mammoths should be preserved. It was the tremendous efforts of these early conservationists that led to the public ownership today of over 95% of the Sierra redwood groves.

In 1945, plans were made to cut this railroad grade up through the center of the South Grove, and to log the huge sugar pines found there. Plans for logging did not include the Sierra redwoods, but logging the other trees would have irreversibly damaged this interrelated community, which has existed for millions of years. The complex forest community is made up of many interdependent members. To remove one part would alter the entire ecosystem and result in numerous negative impacts. If the South Grove had been logged it would have taken many human lifetimes—if ever—for this ecosystem to return to its original state.

The first rule of intelligent tinkering is to save all the pieces. – Aldo Leopold

Fortunately, people such as Frederick Law Olmstead Jr. (world famous landscape architect) and representatives of Save-the-Redwoods League and the California State Park System were able to persuade Pickering executives to postpone logging and keep the railroad outside the South Grove itself. Over the next nine years, a complicated string of events including heroic private fund raising efforts, complex negotiations, and numerous legislative proposals finally led to the public purchase of the South Grove in 1954 for \$2.8 million. Members of the Calaveras Grove Association were instrumental in this effort, as well as John D. Rockefeller Jr. who donated \$1 million through the Save-the-Redwoods League in the final hour. In 1984 the South Grove was designated a Natural Preserve by the State Park Commission and was thus afforded the highest level of protection possible within the State Park System. Today the South Grove stands out as one of the least disturbed Sierra redwood groves.

Any fool can destroy trees. They cannot defend themselves or run away. And few destroyers of trees ever plant any, nor can planting avail much toward restoring our grand aboriginal giants. It took more than three thousand years to make some of the oldest of the sequoias, trees that are still standing in perfect strength and beauty, waving and singing in the mighty forests of the Sierra. Through all of the eventful centuries since Christ's time, and long before that, God has cared for these trees, saved them from drought, disease, avalanches, and a thousand storms; but he cannot save them from sawmills and fools; this is left to the American people.

- John Muir

Mountain dogwood puts on a spectacular show during the spring and fall. In spring, the redwood bark provides contrast for the showy white bracts that surround the tiny flowers. By autumn the flowers have become bright red berries, the leaves turn reddish purple and begin to drop.

Look and listen for mountain quail scurrying through the brushy sections of trail.



CONTINUE ON THE TRAIL AS IT FOLLOWS BIG TREES CREEK UPSTREAM. WHEN YOU COME TO THE FORK IN THE TRAIL, TURN RIGHT AND STOP AT THE SMALL FOOTBRIDGE CROSSING THE CREEK.

Big Trees Creek begins 2.5 miles (4 km) up-canyon, rising from springs set in the hillsides surrounding the South Grove. Even in a drought year, this tiny creek has water in it. From here it flows southwest to join Beaver Creek. The riparian community is much narrower along this creek. The big-leaf maples on the last section of trail provide us with shade during the summer heat. Their seeds twirl and fly like helicopters

so they can settle away from the shade of the parent tree. In the early summer the azaleas in bloom near this bridge provide a sensory treat.

Trout make their home in Big Trees Creek, but it has been closed to fishing by the California Fish and Game Commission in recognition of this watershed's importance to the Sierra redwood ecosystem. One detrimental effect of fishing would be trampled streamside vegetation, leading to increased soil erosion and poor water quality.

You will begin seeing redwoods on the next section of trail. Since it is often hard to distinguish between Sierra redwood trees and incense cedars, the following are some clues for identifying a Sierra redwood.

- **Bark.** Redwood bark is soft and fibrous. The color ranges from cinnamon brown to red to shades of violet. Cedar bark is also red, but not soft.
- **Leaves.** The blue-gray Sierra redwood leaves are small and scale like, resembling juniper foliage. They are arranged in a spiral pattern on a round twig. On older trees they are difficult to see since the branches often begin at 100 feet (30.5 m). The cedar foliage is similar, but is green and looks as if it has been ironed flat.
- **Cones.** Sierra redwood cones are the size and shape of a chicken egg and can contain up to 300 small, flat seeds. Cedar cones have only six scales and are shaped like the classical *fleur-de-lis*.
- **Age.** Old Sierra redwoods have rounded tops and very large branches. Many of the older trees have large burn scars. The oldest known Sierra redwood was 3,300 years old. Young redwoods are cone shaped, like a perfect Christmas tree.
- **Size.** Sierra redwood trees are the largest objects to ever live on earth. The largest trees can attain diameters of 32 feet, and heights over 300 feet (91.4 m)





YOUNG REDWOOD



MATURE REDWOOD



With only a few exceptions, all the South Grove Sierra redwoods exist in only 75 and widely spaced groves along the western slope of the Sierra Nevada Mountains, a question that many people have wondered is, "Why are they *here*?"

To gain insight into this question, we must begin 150 million years ago, when ancestors of redwoods as we know them were the dominant plant from across the northern

hemisphere. The oldest fossil redwood is 150 million years old and many fossils have been found far north of the arctic circle. The earth's climate was much warmer and moister during that time of the giant dinosaurs. Sixty million years ago, as the earth's climate began cooling and drying, the redwoods and their associated forest communities began a long, slow march south. Redwoods crossed over the young Sierra Nevada several million years ago when it was still only a range of low hills. Over the past 14 million years, periods of mountain building, glaciation, and climatic change have further restricted these trees to their present locations. The right combination of soil type, elevation, slope orientation, and water availability has enabled the grove to survive in this location for thousands—perhaps millions—of years. The Calaveras South Grove is the largest Sierra redwood grove north of the Kings River. Besides the North Grove, there is only one very small grove any farther north (in Placer County).

Today there are two species of redwood that naturally occur in California: the Sierra Redwood or giant sequoia (*Sequoiadendron giganteum*) of the western slope of the Sierra Nevada, and the coast redwood (*Sequoia sempervirens*) of the California coast range. Sierra redwoods are the world's largest living things, and the coast redwoods are the world's tallest.

While in the South Grove, you may want to try the recommended "best way to really see a redwood" technique. All you have to do is find a large redwood and lie down beneath the farthest reach of one branch. It helps if you can find a place where you won't be distracted by other people. Stay there as long as you like.

FOLLOW THE TRAIL TO A SCATTERED OUTCROPPING OF WHITE ROCK. LOOK DOWN THE TRAIL AND YOU WILL SEE A LARGE SIERRA REDWOOD CLOSE BY WITH A HUGE BURN SCAR ON ITS UPHILL SIDE. STOP HERE.



The white rock is milky quartz. It was probably formed soon after the granite bedrock.

By now you have probably noticed that most of the older, larger redwoods bear the marks of past fire. These large burn scars are the result of natural, lightning-sparked fires. Sierra redwoods are a fire adapted tree. In other words, not only can they survive forest fires, but they cannot survive as a species without fire.

Small, frequent fires reduce the growth of small trees and brush, and burn off the material that accumulates on top of the soil, such as dead branches, twigs and leaves. This exposes the mineral soil and creates openings for sunlight, both necessary ingredients for sequoia seed germination. Without fire, Sierra redwoods would be much less successful at reproducing, and another type of tree could eventually become dominant.

For many years after our country was settled, fires of all kinds in the forests of the United States were suppressed. This created a very dangerous situation, in which tons of potential fire fuel was allowed to build up. Many huge, uncontrollable, and destructive forest fires have been the result. Since then we have learned that smaller, frequent fires are beneficial, if not necessary, for the health of our forests and wildlife.

At Calaveras Big Trees State Park, prescribed burning is an important part of the management plan for not only both Sierra redwood groves, but for all areas of the park. A prescription burn is a carefully planned and administered fire, conducted only when moisture, wind and fuel conditions will allow an easily controlled fire. The North Grove was burned this way during 1983 and 1984. The South Grove was burned between 1975 and 1981. Prescribed burns will occur periodically in the two groves in an attempt to recreate more natural conditions.

Besides protecting these groves from human misuse and conducting prescribed burns, scientific observation is a key part of their management. New trees will not be planted to expand the groves. Rather, their natural growth and reproduction patterns will be monitored so we can understand more about them. It has been exciting to watch the new redwood seedlings appear after the first burns were completed. Very few seedlings had been observed before the program of burning started, and now there are large areas of seedling germination in both groves. During a recent mapping project, an estimated 15,000 new seedlings were observed in the South Grove. This stand of ancient relics is alive and well.



BUSH CHINQUAPIN
Castanopsis sempervirens

A shrub that indicates past fire can be seen growing very close to the next section of trail. Chinquapin does well in open sunny locations and often grows in recently burned areas. Its smooth, rounded leaves are green on top, and dusty yellow underneath.

. . . Fire, the great destroyer of the sequoia, also furnishes the bare ground required for its growth from the seed.

- John Muir.

FOLLOW THE TRAIL TO THE LARGE HOLLOW REDWOOD THAT HAS FALLEN ACROSS BIG TREES CREEK.

No living person can say exactly when this giant crashed across Big Trees Creek. Since decay occurs very slowly in the rot-resistant wood of the Sierra redwood, it is possible that this tree has been lying here for many centuries, quietly returning to the air, water, and soil. It was hollowed out by fire while still standing, breaking into section upon impact with the ground.

Although this giant is dead, it is providing for more life. When it fell, a hole was opened in the canopy of the forest as well as in the ground, providing sunlight and access to mineral soil for redwood seeds. If you look up the hill you will see several young Sierra redwoods taking advantage of this situation. The top of the old giant itself has made a fine seedbed for a young redwood.

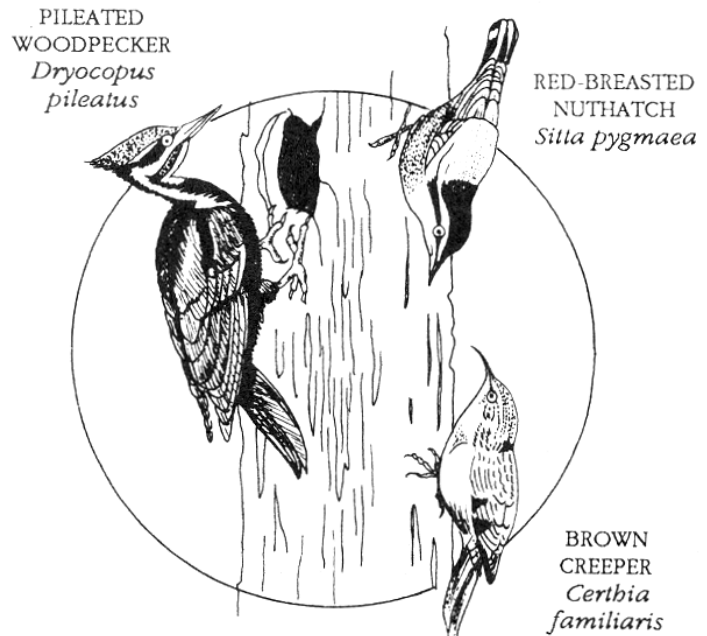
Falling over seems to be one of the few things that can kill these trees, which are resistant to diseases, insects, fire and drought. When you walk to the base of this fallen giant, you can see the Sierra redwood root system. The mature trees do not have a long tap root, but shallow, spreading roots that help support their great mass. These trees topple most often during heavy windstorms, especially if their root system has been affected by erosion or fungus, or the trunk weakened by large burn scars.



Look down the creek to view another Sierra redwood trait known as buttressing. If the environment around one of these trees causes it to lean, it will respond by growing more wood on one side—or buttress—to prevent it from falling. This is fairly common along creeks and on steep slopes.

The area around the creek can be a rewarding place to observe some of the birds of the South Grove. Besides the noisy Stellar's Jay, you may also see the colorful western tanager, the dark-eyed junco with its black hood, the brown creeper circling its way up a tree hunting insects, and the red breasted nuthatch working its way head first down tree trunks on its hunt. There are several types of woodpeckers here,

including the pileated woodpecker—the largest of the Sierran woodpecker—and the more common white-headed woodpecker. Several types of owls and hawks have also been sighted in the preserve.



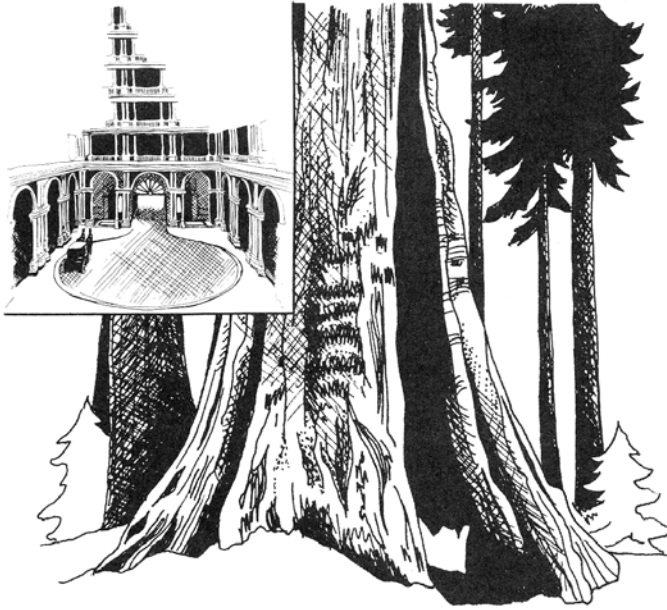
Fifty feet (15 m) past the fallen giant is a trail junction. From the junction you can turn left to complete the loop trail downhill back to the parking lot, or turn right to continue 0.6 miles (1 km) on a gentle uphill path ending at the Agassiz Tree, the largest in the park.

IF YOU TURN LEFT, START FOLLOWING THIS GUIDE AGAIN ON PAGE 14.

IF YOU TURN RIGHT, CONTINUE ON THE TRAIL TO THE PALACE HOTEL TREE. ON YOUR WAY THERE:

About 250 yards (230 m) towards the Palace Hotel Tree, look on the right for the “Chimney Tree”—a large redwood burned inside so severely that a chimney was formed up through its broken top. The thick redwood bark is relatively fire-resistant, but fire sometimes does manage to burn through. When this happens, fire can carve out a chamber inside a still living tree. You can see the bark and the thin layer of white sapwood underneath growing over the burn scar. The sapwood is transporting the water and nutrients that keep this tree alive.

Another interesting spot to look for is an area of lush redwood seedling growth just past two large redwoods that are very close to the trail.



In the 1870's, visitors to the South Grove named this tree after San Francisco's, newly opened, elegant seven story Palace Hotel. The large opening in the base of the tree reminded viewers of the central courtyard carriage entrance called the Grand Court.

It was a common practice in the early days to name these trees after presidents, generals and famous scientists. Many of the Sierra redwoods at Calaveras had engraved marble plaques affixed to their trunks, although there was some argument about placing the names of "mere mortals" on these ancient giants. When acquired by the state, the marble plaques came down, so that visitors could enjoy the groves in their natural state. Some names are still used today for identification purposes.

FOLLOW THE TRAIL A SHORT DISTANCE TO THE AGASSIZ TREE.

This tree was named for Louis Agassiz (1807-1873), a Swiss zoologist who became one of America's leading naturalists. He was the last great scientific creationist and a leader in the awakening interest in the natural sciences. His two major achievements were the development of the theory of ice ages and a monumental work on the classification and relationships of all fossil fishes. In 1875 one of his admirers send a marble plaque bearing his name from Boston to James Sperry, owner of the two Calaveras groves. It was then placed on this tree, the largest in either grove.

The Agassiz Tree (pronounced ag'-uh-see) is the largest example in this park. Walk around this tree to receive the full impact of its size. Approximate dimensions of this mammoth are:

25 feet (7.6 m) in diameter at 6 feet (1.8 m) above ground, and 250 feet (76.2 m) tall. Just how big is that? Try comparing the diameter to the largest room in your house, and the height to the length of a football field. Great blue whales, the largest animals that can weigh over 150 tons (136.1 tonnes), while the weight of a Sierra redwood can reach 6,000 tons (5.4 kilotonnes). The very largest of the Sierra redwoods occur in the southern groves, with heights of over 300 feet (91.4 m) and 32 foot diameters (9.8 m).



Sierra redwoods are some of the world's oldest living things as well. They are outlived only by the 4,000-year-old bristlecone pines in remote mountain ranges of the Great Basin region. The oldest known Sierra redwood was 3,200 years old, and many live over 2,000 years. Ideal soil, water, and sunlight conditions in this spot have enabled this tree to thrive here for perhaps 2,000 years. It can be humbling to think about the age of these trees. Columbus' voyage to the New World was 500 years ago, and the United States was formed just over 200 years ago. The tree standing before you now was already old by then, and was possibly growing here even before Christ was born.

Let us be reverent a little as we stand here in the hush of these leafy sanctuaries—be reverent a little if reverence in this age is possible. These great trees belong to the silences and the millenniums. Many of them have seen more than a hundred of our human generations rise and give out their little clamors and perish. They chide our pettiness, the rebuke our impiety. They seem, indeed, to be forms of immortality standing here among the transitory shapes of time.
- Edwin Markham, 1914

FROM HERE, YOU MAY EITHER BACKTRACK TO THE LAST TRAIL JUNCTION TO COMPLETE THE LOOP TRAIL, OR EXPLORE THE UPPER PORTION OF THE GROVE. *There is no trail to the upper portion of the grove and cross country navigational skills are highly recommended.*

TO COMPLETE THE LOOP, PLEASE TURN TO THE NEXT PAGE.

TO EXPLORE FURTHER, PLEASE READ THE FOLLOWING SECTION.

THE ESTABLISHED TRAIL ENDS HERE AT THE AGASSIZ TREE.

You may continue exploring farther up the grove, but please do so only if you have the ability to navigate through an unfamiliar forest wilderness. Remember to tread light in this protected area.

The Moody Group. This is a particularly beautiful group of Sierra Redwoods. A prominent tree was named for Dwight L. Moody, a 19th century evangelist.



MOODY GROUP

The Smith Cabin Tree. This tree is the second largest in the park. Named for Alexander Jackson “Trapper” Smith who lived in its hollow base in the late 1850’s. He was employed by the owner of the two groves, James Sperry, as a guide, hunter, and general handyman. One of his numerous jobs was to cut samples of Sierra redwood bark and wood for souvenirs. Signs of his handiwork can be seen in both the North and South Groves.

Old Goliath. Old Goliath was one of the largest trees in the grove until it came crashing down during a violent windstorm in December of 1861 as “Trapper” Smith listened from inside his tree cabin. He didn’t dare to venture outside as the force of the storm tossed tree tops about, twisted branches off and hurled entire trees to the ground. He wondered if his creaking and trembling tree would be the next to go. The earth shook when the enormous Old Goliath fell, and Smith was certain that his end had come. Luckily, both Smith and his tree survived this wild storm. Although it has been over 140 years since this tree fell, it still has much of its bark.

The Portals. Ambitious hikers may want to find the redwood that grows the farthest distance from the trailhead. This tall tree with no burn scars belongs to the group of three redwoods known as the Portals.

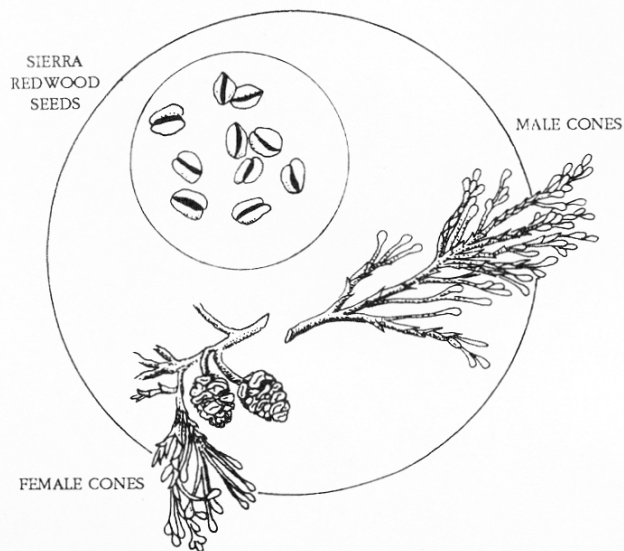
AFTER PASSING THE TRAIL JUNCTION, STOP AT THE KANSAS GROUP, A GROUP OF THREE LARGE REDWOODS TO THE LEFT OF THE TRAIL.

Sierra redwoods often grow in groups of two or three because an area of mineral soil opened up where many seeds took root. They are not able to sprout from roots or stumps as are the coast redwoods. These three redwoods prevailed in the stiff competition for sun, water, and nutrients. The percentage of seeds that find the perfect conditions for germination and seed-



ling survival is very low. Some experts estimate that one in a million seeds ever germinates, and even fewer ever grow to maturity. The trees compensate for this by producing an average of 1,500 cones per tree each year. With each cone containing an average of 200 seeds, this theoretically could result in eight billion seeds in the South Grove. However, not all seeds are released each year. Seeds are released in two ways: an explosive release of large numbers of seeds in response to environmental conditions, and a continuous release of smaller amounts by animals.

It takes two years for a Sierra redwood cone to mature. In the spring, you may notice clouds of yellow pollen being blown around the grove. This wind-borne pollen comes from smaller male cones or “flowers” on the tree and must come into contact with the larger female cones in order for seeds to be fertilized. Mature cones can remain green and closed on the tree for up to 20 years. The cone stems have rings that can be counted like tree rings to determine their age. Many seeds are released when heat from the sun causes the cones to open, or when cones are knocked off the trees by wind, heavy snowfall, or ice deposits from ice storms. However, an important agent of seed release and germination is fire. When heat from a fire warms the cones, they dry out and open, thereby releasing seeds. This results in many seeds being released at once onto soil primed for germination by fire.



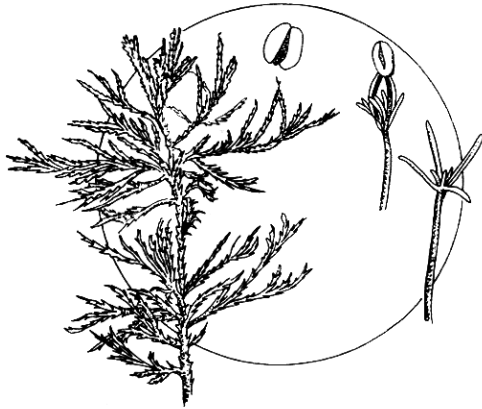
Two animals have been found to be associated with Sierra redwood seed dispersal: a long-horned beetle (*Phymatodes nitidus*) and the Douglas squirrel or chickaree (*Tamiasciurus douglasii*). Although over 140 species of insects use these trees during part of their life cycles, only one may actually help to release the seeds. The *Phymatodes* beetle lays its eggs in a redwood cone. The larvae then feeds on the inside of the green cone. This progressively kills the cone scales, which gradually dry out and release the seeds.

Douglas squirrels are the small but very energetic and vocal squirrels you may have seen on your walk. John Muir describes them as “. . . the brightest of all squirrels I have seen, a hot spark of life, making every tree tingle with his prickly toes. . . a condensed nugget of fresh mountain vigor and valor . . .” These squirrels feed on redwood cones, but not on the seeds. Sierra redwood cones have very fleshy scales, which the chickarees prefer over the tiny seeds of which 6,000 equal one ounce (28.4 g). Active all year long, chickarees scramble to the crowns of trees, biting off thousands of the green cones annually. One squirrel was observed cutting 538 cones in 30 minutes. The cones are stored underground or in tree hollows in caches of just a few to hundreds of cones. The cones are eaten later, even when under snow. The Douglas squirrel may actually be planting Sierra redwood trees in this way.



DOUGLAS SQUIRREL
Tamiasciurus douglasii

Just beyond the Kansas Group along the trail is a fallen hollow redwood nicknamed the Keyhole Tree, or the Bear Slide Tree. Local folklore maintains that the inside of this log is smooth because black bears sometimes sighted in the grove use it as a slide. If you look through the “keyhole” and in the pit created when it fell, you will see many young Sierra redwoods.



SIERRA REDWOOD SEEDLINGS

**THIS IS THE END OF THE
INTERPRETIVE GUIDE.**

You now have a bit over one mile (1.6 km) to hike downhill to reach the parking lot. If you would like to learn more about the Sierra redwoods or other aspects of the park, please stop by the Visitor Center at the North Grove.

The Redwoods, once seen, leave a mark or create a vision that stays with you always. No one has ever successfully painted or photographed a Redwood tree. The feeling they produce is not transferable. From them comes silence and awe. It's not only their unbelievable stature, nor the color which seems to shift and vary under your eyes, no, they are not like any trees we know. They are ambassadors from another time.

- John Stienbeck, 1962

This guide was originally written by Wendy Harrison, Interpretive Specialist for the Calaveras Big Trees Association. Illustrations were done by Peg Carkeet, an artist and teacher from Twain-Harte, California.

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